Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims

CLAIMS

1. (previously presented) A method of extracting regions of homogeneous color in a digital picture comprising the steps of:

dividing the digital picture into blocks wherein each block comprises a plurality of pixels; and

merging together spatially adjacent blocks that have similar color properties to extract the regions of homogeneous color, wherein the merging step comprises the additional steps of:

extracting a feature vector for each block;

estimate a scalar gradient value for each block as a function of the feature vector, the set of gradient values defining a color gradient field;

digitizing the color gradient field;

preprocessing the digitized color gradient field to produce a smoothed color gradient field; and segmenting the smoothed color gradient field with a watershed algorithm that divides the smoothed color gradient field into a set of spatially connected regions of homogeneous color.

2. (cancelled)

3. (previously presented) The method as recited in claim 1 wherein the extracting step comprises the steps of:

transforming data in each block into a perceptually uniform color system; and

calculate N moments of the data in each block for each color component, the set of moments being the feature vector for the block.

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4. (previously presented) The method as recited in claim 1 wherein the estimating step comprises the steps of:

obtaining distances between the feature vector of each block and the feature vectors of each neighboring block; and

selecting the maximum of the distances as the gradient value for the block.

5. (original) The method as recited in claim 4 wherein the obtaining step comprises the steps of:

applying a weighted Euclidean distance metric to the feature vectors to obtain the distances.

6. (currently amended) ~~The method as recited in claim 4~~ A method of extracting regions of homogeneous color in a digital picture comprising the steps of:

dividing the digital picture into blocks wherein each block comprises a plurality of pixels; and

merging together spatially adjacent blocks that have similar color properties to extract the regions of homogeneous color, wherein the merging step comprises the additional steps of:

extracting a feature vector for each block;

estimate a scalar gradient value for each block as a function of the feature vector, the set of gradient values defining a color gradient field;

digitizing the color gradient field;

preprocessing the digitized color gradient field to produce a smoothed color gradient field; and segmenting the smoothed color gradient field with a watershed algorithm that divides the smoothed color gradient field into a set of spatially connected regions of homogeneous color; wherein

wherein the estimating step comprises the steps of:

obtaining distances between the feature vector of each block and the feature vectors of each neighboring block; and

selecting the maximum of the distances as the gradient value for the block; and

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wherein the obtaining step comprises the steps of:

converting the feature vector of each block into a probability mass function-based representation for each color component;

computing distances between the probability mass function-based representations of each block and the corresponding probability mass function-based representations of each neighboring block; and

selecting the maximum distance of the probability mass function based representations as the gradient value for the block.

7. (cancelled)

8. (previously presented) A method for representing spatial relationships between regions of homogeneous color in a digital picture producing data suitable for use in an image database application comprising the steps of:

dividing the digital picture into blocks;

estimating a scalar gradient value for each block by defining a color gradient field corresponding to each block;

representing said data corresponding to the digital picture as a probability distribution function calculated in view of blocks of the digital picture that are homogenous in color and distances between the blocks that are homogenous in color.

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